Lucas Busta

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Highlights

- Eight years research laboratory experience. Excellent skills in chemical analysis including data acquisition, processing, visualization, interpretation, and archival.
- Flexible and dedicated hard worker with exceptional organizational skills and attention to detail.
- Collaborates with domestic and international research groups and individuals with excellent communication and interpersonal skills to successfully accomplish project goals on time.
- Able to carry out multiple projects simultaneously, enabling concomitant pursuits of existing projects, collaborative undertakings, exploratory experiments, and written works.
- Five years hands-on experience maintaining, repairing, and documenting instrumentation and lab equipment: GC-FID, GC-MS, LC-ESI-MS, and gas delivery systems.

Education

2016 **Ph.D. Chemistry**, University of British Columbia
2011 **B.Sc. Chemistry, Biochemistry and Molecular Biology** *(dual major, honors)*, University of Minnesota - Duluth

Teaching

Training in Education

2016 **Instructional Skills Workshop.** Intesive program emphasizing experimental learning . . . . . *24 hrs.*
2016 **Writing Across the Curriculum Workshops.** Literature-based methods for teaching scientific writing . *7 hrs.*
2015 **Teaching Assistant Peer-Mentor Training.** Developed skills in facilitation, mentorship, and teaching . . *6 hrs.*
2011 **Teaching Assistant Training.** Basic skills for teaching assistants in chemistry laboratories . . . . . *12 hrs.*

Teaching Experience

Laboratory Mentor

2011-16 Trained others in the use of chromatographic and mass spectrometric instrumentation, chemical separation, and basic chemical reactions: one visiting professor (Yanjun Guo), two graduate students (Daniela Hegebarth, Yulin Sun), and one undergraduate student (Cassie McDonald). . . . . *8 hrs. ea.*

Teaching Assistant Mentor

2015 Coached teaching assistants new to advanced courses. 2 mentees. . . . . *1 semester*

Teaching Assistant

2016 **Analytical Chemistry Lecture:** In-class tutorials, discussions, quizzes, office hours. 90 students. . . *1 semester*
2015 **Analytical Chemistry Lab:** Instrument design, operation. Analytical methods. 6–12 students. . . . . *1 semester*
2013/14 **Organic Chemistry Lab:** Basic chemical reactions and work-ups. 15 students. . . . . *2 semesters*
2012/13 **Analytical Chemistry Lab:** Instrument design, operation. Analytical methods. 6–12 students. . . . . *2 semesters*
2011/12 **First Year Resource Centre:** Tutored general chemistry students. 5–10 students. . . . . *2 semesters*
2009-11 **Analytical Chemistry Lab:** Quantitation, spectrochemistry, chromatography. 20 students. . . . . *4 semesters*

Technology

R: Advanced user . . . . . *Statistical computing and graphics*
LabVIEW: Advanced user . . . . . *Custom data acquisition and processing*
LaTeX: Advanced user . . . . . *Professional typesetting and document generation*
Mendeley: Advanced user . . . . . *Reference collection and management*
D3 Javascript visualizations: Intermediate user . . . . . *Custom data visualization for complex datasets*
Unix, Git(hub), HTML, CSS: Intermediate user . . . . . *Task automation, version control, website design*

Research

Research Training

2016 **Bioinformatics for Evolutionary Biology** (UBC Biology 525D) ..... *20 hrs.*
2016 **R Carpentry Workshop** Basics of statistical computing in R ..... *12 hrs.*
2012 **Physical and Analytical Chemistry Seminar** (UBC Chemistry 540A) ..... *24 hrs.*
2012 **Principles of Chemical Separation** (UBC Chemistry 534) ..... *72 hrs.*
2011 **Bioanalytical Chemistry** (UBC Chemistry 533) ..... *72 hrs.*
2011 **Advanced Bioorganic Chemistry** (UBC Chemistry 569) ..... *72 hrs*

Research Experience

Graduate Research

2011-16 **Thesis title: *"The Diversity and Biosynthesis of Plant Cuticular Waxes"***
advisor: Dr. Reinhard Jetter, Department of Chemistry, University of British Columbia.
- Detailed chemical analyses of hundreds of plant wax lipid extracts
- Chemical synthesis of authentic standards for structure elucidation and enzyme assay
- Extensive literature review and biosynthetic analysis of specialty plant surface lipids

Laboratory Experience
- Experience with GC-MS, GC-FID, LC-ESI-MS, ToF-SIMS, and NMR.
- Improved, implemented, and documented chromatography and MS equipment maintenance routines.
- Constructed and maintained literature and measurement databases for the research group.
- Developed custom data analysis software to increase throughput facilitating collaboration with domestic and foreign research groups.

Collaborations
- Asst. Prof. Jessica Budke, U. Tennessee-Knoxville. GC analysis of moss cuticular waxes. [2, 3] ... *2014-present*
- Dr. Ulrike Bauer, U. of Bristol. GC and ToF-SIMS analyses of pitcher plant surfaces. [8] *2015-present*
- Dr. Olga Serra Figueras, U. de Girona. GC analysis of cork waxes. [5] *2015-present*
- Prof. Yuelin Zhang, UBC. GC analysis of amino acids. [4, 9] *2015-2016*

Undergraduate Research

2008-11 **Development of a time-domain reflectometry system for monitoring ice formation on bridge decks**
advisor: Dr. John Evans, Department of Chemistry and Biochemistry, University of Minnesota - Duluth.
- Developed LabVIEW data acquisition and processing software to process time-domain reflectometry signals.
- Drafted custom LabVIEW software for spectrophotometric data acquisition and processing.
- Documented the structure and functionality of developed software in written reports.

Presentations

Conference Presentations

2016 **Lucas Busta**, Reinhard Jetter: "Structure and biosynthesis of branched cuticular wax compounds", Poster, *PHYTOCHEMICAL SOCIETY OF NORTH AMERICA*, Davis, CA

2015 **Lucas Busta**, Jessica M. Budke, Reinhard Jetter: "Cuticular waxes from the leafy gametophyte, sporophyte, and calyptra of the moss *Funaria hygrometrica*", Oral Presentation, *BOTANICAL SOCIETY OF AMERICA*, Edmonton, AB

2013 **Lucas Busta**, Jessica M. Budke, Reinhard Jetter: "Hydroxy esters from the gametophyte, sporophyte, and calyptra of the moss *Funaria hygrometrica*", Oral Presentation, *PHYTOCHEMICAL SOCIETY OF NORTH AMERICA*, Corvallis, OR

2011 **Lucas Busta**, Evan Anderson, John F. Evans: "Development of a Time Domain Reflectometry System for the Determination of Ice Formation on Road and Bridge Surfaces", Oral Presentation, *SPRING UNDERGRADUATE RESEARCH SYMPOSIUM*, University of Minnesota Duluth, Duluth, MN

Invited Presentations

2016 **Lucas Busta** "The diversity and biosynthesis of cuticular waxes." Special seminar, *THE BOYCE THOMPSON INSTITUTE*, Ithaca, NY.

2016 **Lucas Busta** "The diversity and biosynthesis of cuticular waxes." Special seminar, *THE CENTER FOR PLANT SCIENCE INNOVATION*, Lincoln, NE.

2016 **Lucas Busta** "Things I wish I'd known before starting graduate research". Special lecture, *UBC CHEMISTRY 319: Practical skills for chemical research*, Vancouver, BC

Publications

First-author publications

in review [1] **Lucas Busta**†, Daniela Hegebarth†, Reinhard Jetter. "Changes in cuticular wax coverage and composition on developing Arabidopsis leaves are influenced by wax biosynthesis gene expression levels and trichome density." *PLANTA*

2016 [2] **Lucas Busta**, Jessica M. Budke, Reinhard Jetter. "Cuticular wax coverage on *Funaria hygrometrica* is similar to vascular plants, but wax composition differs between surfaces of the leafy gametophyte, calyptra, and sporophyte capsule." *ANNALS OF BOTANY*, *in press*

2016 [3] **Lucas Busta**, Jessica M. Budke, Reinhard Jetter. "Identification of β-hydroxy fatty acid esters and primary, secondary-alkanediol esters in cuticular waxes of the moss *Funaria hygrometrica*." *PHYTOCHEMISTRY*, Volume 121, Pages 38-49

Contributing author publications

2016 [4] Pingtao Ding†, Dmitrij Rekhter†, Yuli Ding†, Kirstin Feussner, **Lucas Busta**, Sven Haroth, Shaohua Xu, Xin Li, Reinhard Jetter, Ivo Feussner, Yuelin Zhang. "Systemic Acquired Resistance Deficient 4 encodes a key enzyme for pipecolic acid biosynthesis" *THE PLANT CELL*, *in press*

Manuscripts in preparation

in prep [5] Mercé Figueras, Marissa Molinas, **Lucas Busta**, Reinhard Jetter, Olga Serra Figueras. "Cuticular waxes and wax biosynthesis gene expression from *Quercus suber* and *Quercus ilex*"

in prep [6] **Lucas Busta**, Reinhard Jetter. "The structure and biosynthesis of branched wax compounds in *Arabidopsis thaliana*"

in prep [7] **Lucas Busta**, Reinhard Jetter. "The structural diversity and biosynthesis of specialty plant wax compounds"

in prep [8] **Lucas Busta**, Reinhard Jetter, Ulrike Bauer. "Fine-tuning of epicuticular wax crystal slipperiness in a carnivorous pitcher plant"

in prep [9] Tangjun Sun, **Lucas Busta**, Reinhard Jetter, Yuelin Zhang. "TGA encodes a transcription factor controlling systemic acquired resistance in *Arabidopsis thaliana*"

Awards

2015 **Graduate Student Travel Award**: ($500) ..... *University of British Columbia*
2013 **Best Oral Presentation Award**: ($250) ..... *Phytochemical Society of North America*
2011 **Casmir Ilenda Award for Outstanding Undergraduate Research** ..... *Univ. MN - Duluth*
2011 **F.B. Moore Academic and Leadership Award** ..... *Univ. MN - Duluth*
2010 **American Chemical Society Undergraduate Analytical Chemist of the Year** ..... *ACS*
2010 **Maguire Award for most promising chemistry student** ..... *Univ. MN - Duluth*
2009 **Maguire Award for most promising chemistry student** ..... *Univ. MN - Duluth*

†co-first authors

Service and Other Skills

Community Service

Plants Are Chemists: My blog with stories about phytochemistry in plants' and humans' daily lives. Written to fulfill the difficult but crucial task of communicating science to the public. plantsarechemists.blogspot.com

Socities

PSNA Phytochemical Society of North America (*2013-present*)

Languages

Spanish (Castellano) Fluent in reading, writing, speaking

References

Research

- Dr. Reinhard Jetter, Professor
  - Biological Sciences Building
    6270 University Boulevard
    Vancouver, BC Canada V6T 1Z4
  - 604 822 2477
  - reinhard.jetter@botany.ubc.ca

- Dr. John F. Evans, Professor
  - UMD Chemistry
    227 Chem
    1039 University Dr
    Duluth, MN 55812
  - 218 726 7232
  - jevans1@d.umn.edu

- Additional references available upon request

Teaching

- Dr. Robin Stoodley, Senior Instructor
  - Department of Chemistry
    2036 Main Mall
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  - 604 827 5829
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- Dr. Dan Bizzotto, Professor
  - Department of Chemistry
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